Draft For Public Review

SOUTHWEST ALASKA TRANSPORTATION PLAN REVISION

TECHNICAL MEMORANDUM ON

REVISED COST AND EFFECTIVENESS MEASURES

prepared for the

Alaska Department of Transportation and Public Facilities

Send Comments To:

Allen Kemplen, Area Planner

Central Region Planning

Alaska Department of Transportation and Public Facilities

P.O. Box 196900

Ancorage, Alaska 99519-6900

Phone: 1-888-PLANDOT

Fax: 1-888-PLANFAX

Allen_Kemplen@dot.state.ak.us

prepared by

PB Consult Inc.

June 2004

COMMENTS DUE AUGUST 6, 2004

Introduction

The Southwest Alaska Transportation Plan, an approved component of the Alaska Statewide Transportation Plan, was completed in November 2002. The study area for the plan includes the Alaska Peninsula, Kodiak and its neighboring islands, the Aleutian Islands, the Bristol Bay area, and the Pribilof Islands.

The current Southwest Alaska Transportation Plan needs to be revised. The Alaska Department of Transportation and Public Facilities (ADOT&PF) has been directed by a legal decision to halt all work on the Iliamna-Nondalton road and bridge project until the economic costs and the benefits are considered in this next revision of the Southwest Plan. The revision will extract the Iliamna–Nondalton and the Dillingham–Aleknagik corridor projects from the baseline for the Southwest Plan and subject them to the economic analysis used to assess other projects in the Southwest Alaska Transportation Plan. The Plan revision process will consist of the production of a technical memorandum and a draft revised Southwest Alaska Transportation Plan, review by the Southwest Alaska Transportation Plan Advisory Committee and by the general public, and then production of a final revised document.

The Iliamna–Nondalton (Figure 1) and Dillingham–Aleknagik (Figure 2) corridor projects involve two categories of plan elements described in the November 2002 Southwest Alaska Transportation Plan document, Cook Inlet to Bristol Bay Corridor – Land Transportation System and Dillingham/Bristol Bay Area – Land Transportation System.

Figure 1: Iliamna–Nondalton Road

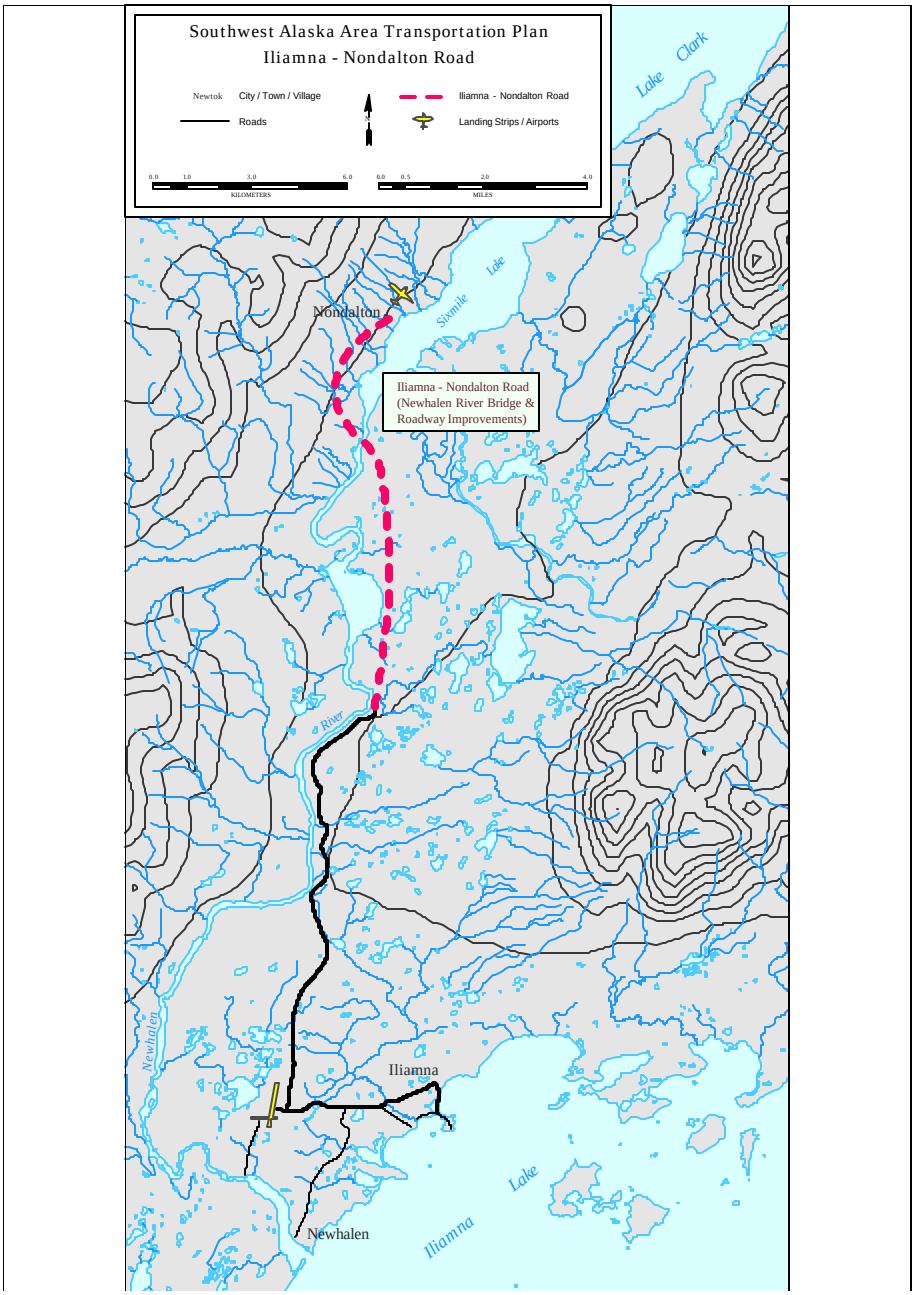
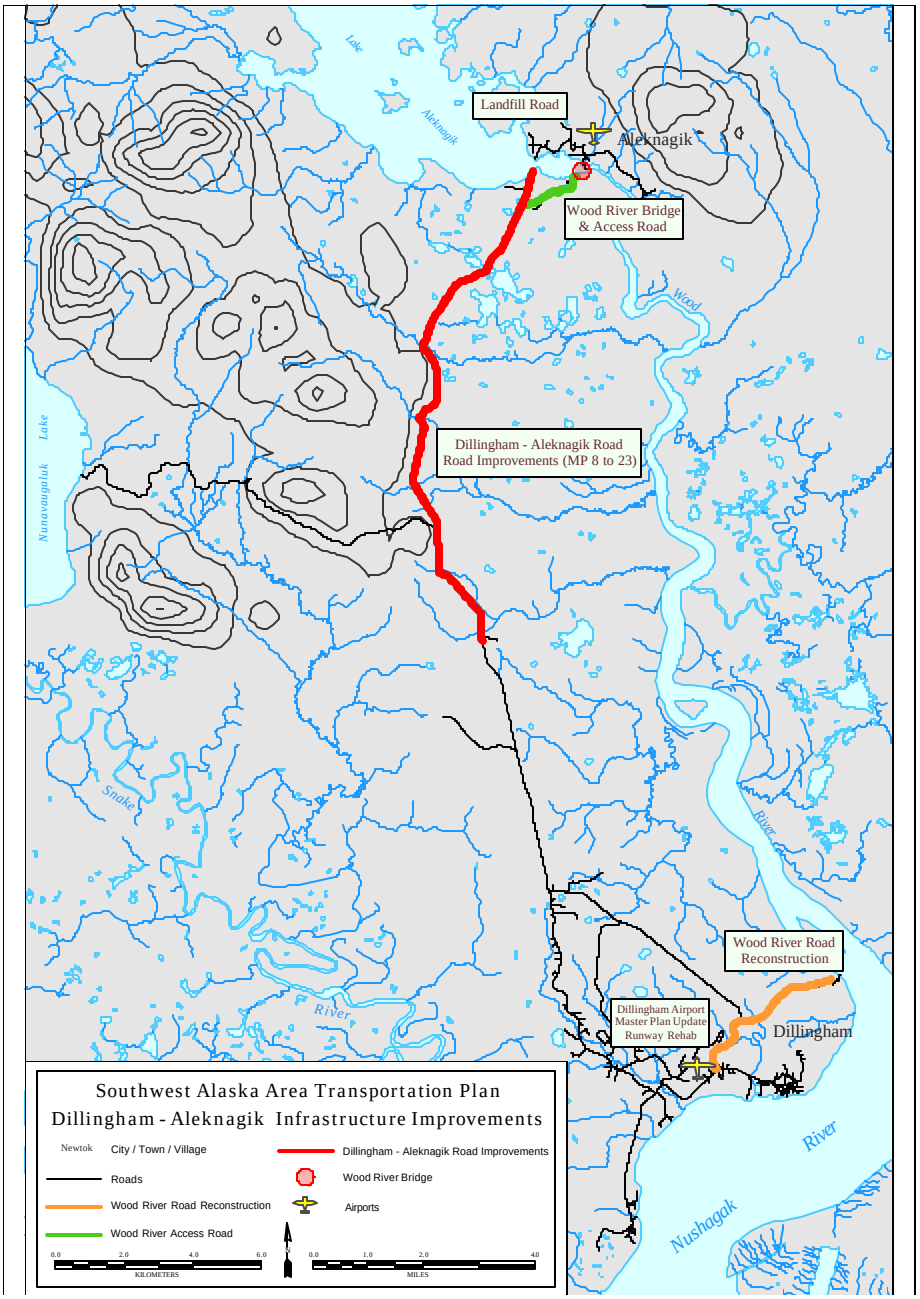


Figure 2: Dillingham and Aleknagik Area Improvements



Evaluation Methodology

The evaluation methodology for the Iliamna–Nondalton and Dillingham–Aleknagik projects is the same as that used for other land transportation projects in the November 2002 Southwest Alaska Transportation Plan. The evaluation methodology considers the benefits and costs of the proposed new transportation facilities. Within the context of Southwest Alaska Transportation Plan process, a project's benefits are defined by how it relates to the goals established for the Plan:

Goal 1: Provide Basic Access for Health, Education and Safety
Provide communities of Southwest Alaska with usable and safe access to clean water, sanitation, and basic social services, including medical services, schools and law enforcement.

Goal 2: Assure the Preservation of the Needed Transportation System
Preserve and maintain existing transportation facilities and services that have been identified as necessary for both current and future conditions.

Goal 3: Enhance Transportation System Efficiency
Provide regional transportation facilities and services in the most efficient and cost-effective way possible.

Goal 4: Improve Transportation Levels of Services
Improve the frequency, reliability and quality of regional transportation services.

Goal 5: Enhance System Adaptability and Flexibility
Develop and maintain a regional transportation system that can effectively adapt to changing physical, economic and demographic conditions.

Goal 6: Develop and Protect Economic and Subsistence Resources
Provide transportation facilities and services that support regional economic vitality while maintaining the region's unique environmental and cultural resources.

In order to compare projects, it is necessary to devise a measure that can be readily estimated for each project while reflecting its success in meeting some or all of the goals of the Plan. A review of the goals indicates that such a measure cannot be expressed merely in monetary terms, particularly for a goal such as providing basic access for health, education and safety. Rather a measure was chosen that reflects the success of the proposed project by its use – estimated year 2000 person trips on the facility. The methodology for estimating year 2000 person trips is described in *Southwest Alaska Transportation Plan*

– Description of Alternatives Technical Memorandum, Appendix H: Demand Estimate Methodologies (August 1999).

Using a non-monetary measure of benefits, demanded by the nature of the Southwest Alaska Transportation Plan Goals, requires use of an evaluation framework other than the type of benefit-cost analysis that was often used for infrastructure projects in past years. A traditional benefit-cost analysis required that all benefits and all costs be expressed in monetary terms. This required that dollar values be placed on such benefits as saving lives. While monetizing such benefits has always been problematic, the planning profession has increasingly recognized that trying to fit a wide variety of benefits (and costs also, such as environmental impacts) into a purely economic framework is inconsistent with the way people and society truly make decisions. A solution is to use a cost-effectiveness evaluation framework where a measure of effectiveness, such as year 2000 person trips, is compared against the net cost of the project. The use of "net cost" allows the value of those benefits that can be expressed in dollar terms, such as estimated reduction in the price of freight delivered to communities, to be subtracted from project costs that are also expressed in dollar terms. In order to compare against an annual measure of effectiveness, it is most useful to express net cost in annual terms also.

For the Southwest Alaska Transportation Plan evaluation methodology, the net annualized cost consists of several elements: the annual operations and maintenance (O&M) cost of the segment (assuming the segment is open year round); plus an annualized capital cost for the segment; minus the estimated annual freight cost savings resulting from implementation of the roadway system, allocated to each segment.

The annualized capital cost was calculated for each project based upon the total capital cost and an assumed 20-year design life of each project. Using a 7% discount rate, the annualized cost is the annual payment over 20 years that is equivalent in present value to the total capital cost for each project. Use of this annualization approach facilitates the useful comparison of capital costs to O&M costs on an annual basis. The methodology for estimating capital and O&M costs is described in *Southwest Alaska*

Transportation Plan – Description of Alternatives Technical Memorandum, Appendix C: Roadway Link Cost Analysis (August 1999).

Calculation of the freight cost savings and allocation of these savings to roadway segments is described in the Freight Cost Savings section of this Technical Memorandum. A more detailed discussion of freight cost savings is contained in *Southwest Alaska Transportation Plan – Freight Impact Analysis of Potential Alaska Peninsula Roadway Segments and Regional Freight Movement Summary Technical Memorandum* (March 2000).

The next section, Findings, describes evaluation results and the recommended priority order for roadway segments in the Cook Inlet to Bristol Bay Corridor and in the Dillingham/Bristol Bay Area, based on the cost and effectiveness measures calculated for each segment.

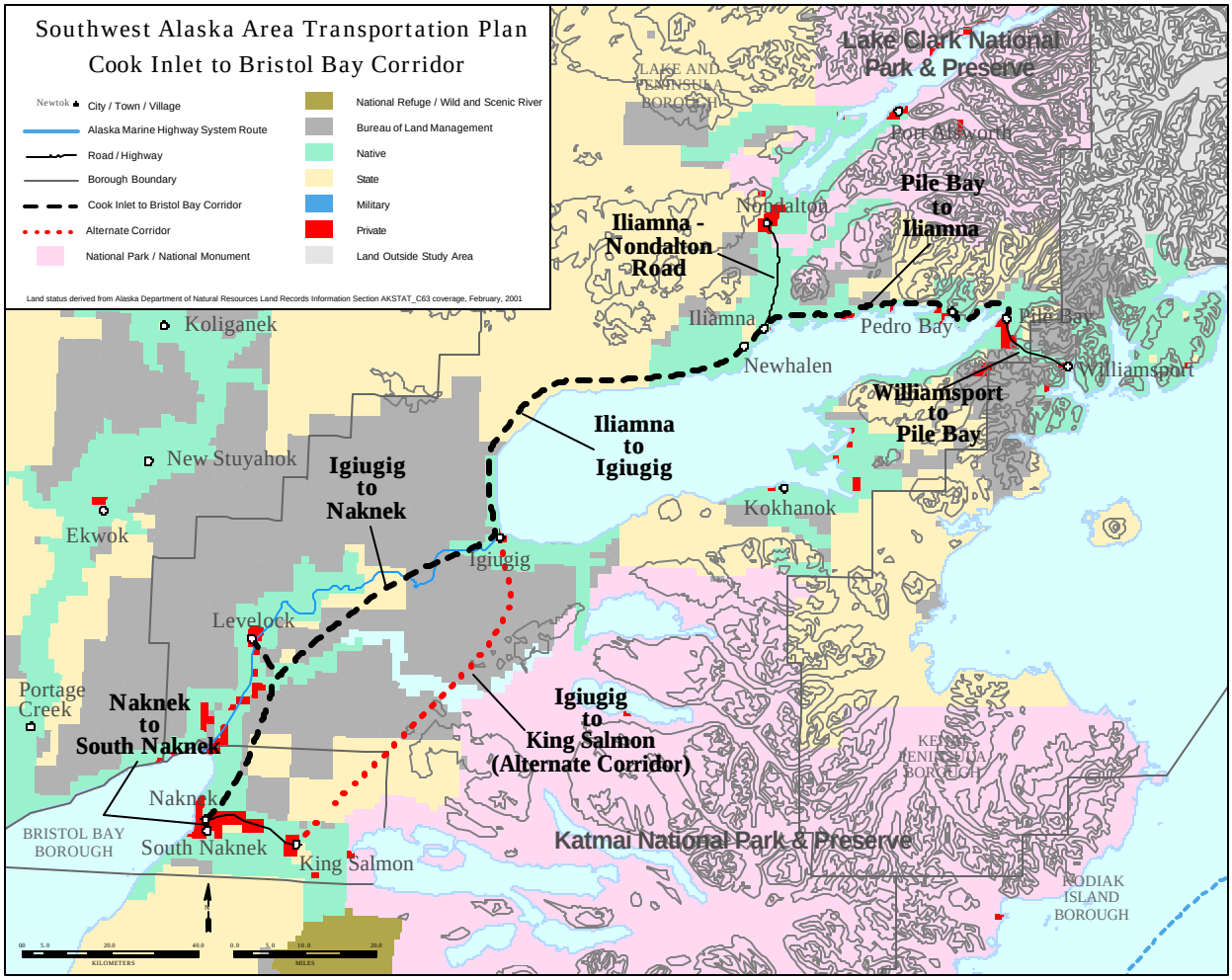
Findings

Cook Inlet to Bristol Bay Corridor

The Southwest Alaska Transportation Plan proposes the development, over time, of a surface transportation link between Cook Inlet and Bristol Bay (Figure 3). This roadway would improve mobility and access for many communities in the area, including Pedro Bay, Nondalton, Iliamna, Newhalen, Igiugig, Naknek and King Salmon – providing them for the first time with a well developed surface transportation link to the Kenai Peninsula, Anchorage, and the state's primary roadway network. The road also has significant potential for improving the efficiency of regional freight movement and economic development. Benefits to the region and to the communities along the proposed corridor include the following:

- It would open up a shorter, safer, less expensive freight route from Cook Inlet to Bristol Bay; it would no longer be necessary to transport goods by barge all the way around the Alaska Peninsula.
- By making scenic areas, businesses, and lodges along the corridor more accessible to visitors, this alternative would support tourism in the region.
- The road would provide the communities of interior Southwest Alaska with greater connectivity to one another, which would promote their economic development.
- The project would promote economic efficiency and diversification in the communities dependent on the Bristol Bay fishery. Boat repair and storage facilities are limited in Bristol Bay, requiring many boat owners to bring their boats to Homer. The overland route would avoid the time-consuming and hazardous open ocean voyage around the Alaska Peninsula, thereby saving money and increasing safety. Use of the route also would save deterioration of fishing boats not designed for extensive open-ocean travel.

Figure 3: Cook Inlet to Bristol Bay Corridor



The segments of the corridor will need to be developed over time. Table 1 presents a recommended priority order for construction of the segments.[1]

Table 1
Recommended Priority Order for Road Construction
Cook Inlet to Bristol Bay Corridor

Segment	Estimated Capital Cost
Williamsport to Pile Bay	$22,285,000
Iliamna to Nondalton	$12,520,000
Naknek to South Naknek	$30,602,000
Pile Bay to Pedro Bay to Iliamna	$51,870,000
Iliamna to Igiugig	$87,880,000
Igiugig to Naknek	$127,675,000

At present, it appears that only the first three segments, Williamsport to Pile Bay, Iliamna to Nondalton, and Naknek to South Naknek, are likely to be constructed in the next 20-year period. However, circumstances could occur that might trigger consideration of an earlier implementation for some of the segments:

- Rapid population growth in one or both communities connected by the potential link, or a combined population rise to double the figure forecasted for year 2020.
- Discovery of high value resource that could potentially be accessed economically through development of the link.[2]

[1] The segments listed in Table 1 have been studied at varying levels of detail. Some, such as the Iliamna–Nondalton Road, have most engineering and environmental documentation completed. Others segments are only conceptual at this time. As they are studied further, alternative alignments and possibly alternative modes other than roadway may emerge as preferred solutions.

[2] The Pebble Gold-Copper Mine, in particular, may accelerate the development of a roadway on the north side of Iliamna Lake. The port requirements for the mining project may also dictate development of a port on Iniskin Bay, with a road connection to Iliamna Lake, in addition to the existing connection between Williamsport and Pile Bay.

- Major business/economic development in one or both communities connected by the potential link.
- Availability of new transportation technology that dramatically reduces capital and/or operating costs for a particular link
- Catastrophic natural disaster that alters normal transportation development pattern.

Table 2 describes cost and effectiveness measures for each of the Cook Inlet to Bristol Bay Corridor roadway segments. Two sets of estimated annual 2020 person trips are shown. The first reflects estimated travel if only the Cook Inlet to Bristol Bay Roadway System is implemented; i.e. assuming that neither the roadway connection to Dillingham nor the Alaska Peninsula roadway from South Naknek to Ivanof Bay is implemented. The second set of demand numbers assume that all the proposed roadway connections are implemented.

Table 2
Cost and Effectiveness Measures of Proposed Roadway Segments
Cook Inlet to Bristol Bay Corridor

Segment	Annual O&M Cost	Annualized Capital Cost @ 7% Interest	Annualized Capital Cost plus O&M Cost	Estimated Annual Freight Cost Savings	Net Annualized Cost	Cook Inlet to Bristol Bay Roadway System Only		Full System	
						Estimated Annual 2020 Person Trips	Net Annualized Cost per Person Trip	Estimated Annual 2020 Person Trips	Net Annualized Cost per Person Trip
Williamsport to Pile Bay	$209,250	$2,577,550[1]	$2,786,800	$3,848,400[2]	$0	1,900	$0.00	5,000	$0.00
Pile Bay to Pedro Bay to Iliamna	$513,000	$4,896,160	$5,409,200	$2,247,800[3]	$3,161,400	22,900	$138.05	33,300	$94.94
Iliamna to Nondalton	$225,450	$1,181,810	$1,407,260	$115,800[3]	$1,291,460	99,300	$13.01	114,900	$11.24
Iliamna to Igiugig	$756,000	$8,295,250	$9,051,300	$1,974,700[3]	$7,076,600	115,800	$61.11	126,300	$56.03
Igiugig to Naknek	$1,012,500	$12,051,620	$13,064,100	$599,100[3]	$12,465,000	127,500	$97.76	214,450	$58.13
Naknek to South Naknek	$61,290	$2,888,830	$2,950,120	$83,900[3]	$2,866,220	115,400	$24.84	278,300	$10.30

[1] The capital cost used in this calculation includes the Williamsport to Pile Bay roadway improvements as well as navigation improvements at Williamsport and construction of a public dock and boat launch at Pile Bay.
[2] See Table 9.
[3] See Table 12

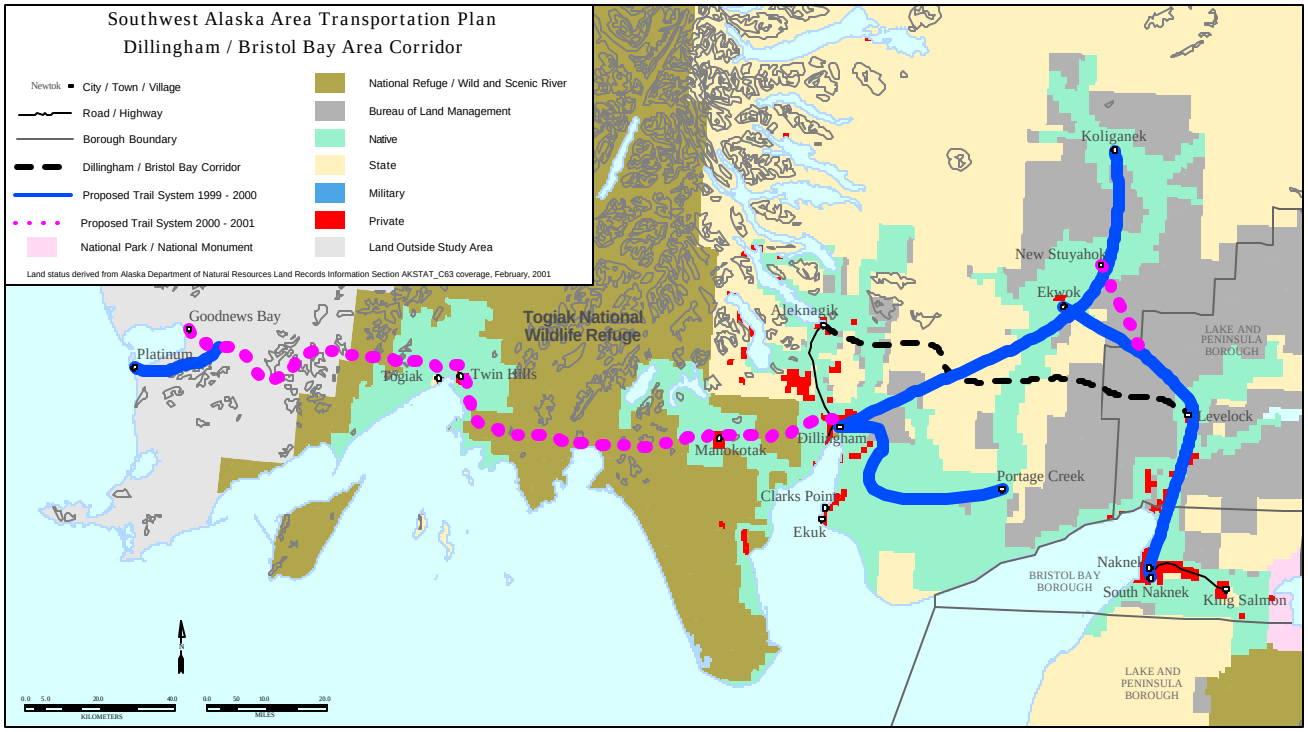
The first recommended segment, Williamsport to Pile Bay, has the lowest net annualized cost of the group as the freight savings are greater than the cost. The second segment, Iliamna to Nondalton, has the second lowest net annualized cost of the group and has the lowest net annualized cost per person trip, assuming implementation of just the Cook Inlet to Bristol Bay Roadway System.[3] The third segment, Naknek to South Naknek, has the lowest net annualized cost per person trip, assuming implementation of both the Cook Inlet to Bristol Bay Roadway System and the Alaska Peninsula Roadway System. The Naknek to South Naknek connection, by providing access for South Naknek residents to the communities on the north side of the Naknek River and to the regional airport at King Salmon, would shift the purpose of the South Naknek airport away from its current role as primary community access. With a bridge connection to South Naknek, the appropriate roles and ownership of all the airports in the Bristol Bay Borough, South Naknek, Naknek and King Salmon, should be re-examined.

[3] The Iliamna to Nondalton segment was also examined as a stand-alone project, i.e. assuming its completion without implementation of the Cook Inlet to Bristol Bay Roadway System. This is described as Scenario 3 in the Freight Cost Savings section of this Technical Memorandum. Under this assumption the segment would have a Net Annualized Cost of $971,860; 75,300 estimated annual 2020 person trips; and a Net Annualized Cost per Person Trip of $12.91.

Dillingham / Bristol Bay Area

In the Dillingham/Bristol Bay Area the Southwest Alaska Transportation Plan recommends the development, over time, of a roadway connection between Dillingham and the Cook Inlet to Bristol Bay roadway system (Figure 4).

Figure 4: Dillingham / Bristol Bay Corridor



The segments of the corridor will need to be developed over time. Table 3 presents a recommended priority order for construction of the segments. At present, it appears that only the first segment, Dillingham to Aleknagik, is likely to be constructed in the next 20-year period. However changing circumstances could trigger consideration of an earlier implementation for some of the segments. [4]

Table 3
Recommended Priority Order for Road Construction
Dillingham/Bristol Bay Area

Segment	Estimated Capital Cost
Dillingham to Aleknagik	$17,600,000
Jct. w/ Igiugig Road to Levelock	$43,635,000
Levelock to Aleknagik	$167,240,000

Table 4 describes cost and effectiveness measures for these roadway segments. The Dillingham to Aleknagik segment has the lowest Net Annualized Cost and the lowest Net Annualized Cost per Person Trip.[5] The remainder of the roadway connection between Dillingham and the Cook Inlet to Bristol Bay road would be developed over time, starting with a connection between Levelock and the Igiugig to Naknek road, and then followed by the segment between Levelock and Aleknagik. These latter two segments are not envisioned in the next 20 years; until the Cook Inlet to Bristol Bay corridor is fully developed there is little justification for investing the resources needed to develop and maintain them.

[4] The segments listed in Table 3 have been studied at varying levels of detail. Some, such as the Dillingham–Aleknagik Road and Wood River Bridge, have some engineering and environmental documentation completed. Others segments are only conceptual at this time. As they are studied further, alternative alignments and possibly alternative modes other than roadway may emerge as preferred solutions.

[5] The Dillingham to Aleknagik segment was also examined as a stand-alone project, i.e. assuming its completion without connection to the Cook Inlet to Bristol Bay Roadway System. This is described as Scenario 3 in the Freight Cost Savings section of this Technical Memorandum. Under this assumption the segment would have a Net Annualized Cost of $2,981,400; 124,150 estimated annual 2020 person trips; and a Net Annualized Cost per Person Trip of $24.01.

Table 4
Cost and Effectiveness Measures of Proposed Roadway Segments
Dillingham/Bristol Bay Area

Segment	Annual O&M Cost	Annualized Capital Cost @ 7% Interest	Annualized Capital Cost plus O&M Cost	Estimated Annual Freight Cost Savings	Net Annualized Cost	Full System: Estimated Annual 2020 Person Trips	Full System: Net Annualized Cost per Person Trip
Jct. w/ Igiugig Road to Levelock	$256,500	$4,118,840	$4,375,300	$1,343,400[1]	$3,031,900	307,500	$9.86
Levelock to Aleknagik	$972,000	$15,786,270	$16,758,300	$1,170,900[1]	$15,587,400	311,200	$50.09
Aleknagik to Dillingham	$240,300	$3,129,360	$3,369,700	$994,800[1]	$2,374,900	352,200	$6.74

[1] See Table 12.

Freight Cost Savings

The approach to estimating the cost savings for the movement of freight resulting from implementation of port and roadway improvements in Southwest Alaska is described in Appendix B of the Southwest Alaska Transportation Plan, November 2002, and in *Freight Impact Analysis of Potential Alaska Peninsula Roadway Segments and Regional Freight Movement Summary Technical Memorandum* (March 2000). Some of the material from these reports will be repeated here for background but the reader should refer to the earlier reports for more detail. Also, the earlier reports examined freight savings resulting from port and roadway improvements in three sections of Southwest Alaska, the Cook Inlet to Bristol Bay Roadway System, the Alaska Peninsula Roadway System, and the Dillingham/Bristol Bay Area. This Technical Memorandum only examines the Cook Inlet to Bristol Bay Corridor and the Dillingham/Bristol Bay Area and, more specifically, focuses on the inclusion of the Iliamna–Nondalton and Dillingham–Aleknagik projects in the analysis. The analysis in the Southwest Alaska Transportation Plan, November 2002, assumed implementation of these two projects so freight cost savings resulting from the implementation of these individual links were not calculated. Rather freight cost savings that would benefit Nondalton, as a result of being connected to a Cook Inlet to Bristol Bay Roadway system, were aggregated with the freight cost savings that would benefit Iliamna and Newhalen. Similarly, freight cost savings that would benefit Aleknagik were aggregated with the savings that would benefit Dillingham.

Background

The roadway links proposed as part of the Southwest Alaska Transportation Plan are expected to have significant impacts on the costs and logistics of regional freight movement. Most freight is currently either barged around the Alaska Peninsula into Bristol Bay, and then for the Iliamna Lake communities offloaded, reloaded onto smaller vessels, and barged up the Kvichak River, or flown in from Anchorage. The new roadway links, together with navigation and port improvements, would enable goods to be

moved by barge to Williamsport then by truck to their final destination, in many cases at considerably less expense.

It is possible to determine just how much less expensive by forecasting future volumes of cargo consumption, estimating current rates under the existing infrastructure and by estimating future rates under the proposed roadway linkages.

At the heart of the analysis are estimates of current and forecast consumption of goods, including petroleum products. Existing freight movement costs and modal splits (e.g., the percentage of goods by volume carried by commercial marine and air shipment, respectively) are also estimated. These estimates are inputs into the calculation of total freight movement costs into the future under existing conditions; that is, given the existing freight movement infrastructure.

In order to compare these costs with the costs that would be incurred if given links were developed, separate rate calculations and mode splits are modeled under specified changes in the freight movement infrastructure. This changed infrastructure entails roadway linkages among a number of study area communities and between these communities and major marine ports. These rate and mode split estimates are then applied to the forecast volumes. The end result is a comparison of total freight movement costs under existing conditions versus under total freight movement costs under the specified surface transportation improvements.

To assess the cost savings achievable from making the proposed transportation improvements, one simply multiplies the forecast volume of goods for the 2020 design year by rates under existing conditions and by rates with the proposed improvements. Put simply, the difference between these totals represents the freight movement savings achievable by implementing the proposed improvements.

The freight movement impact of any individual link is very much a function of how many other contiguous links are implemented. The number of possible combinations of individual links that might be

implemented at any point in time is very high. For this reason, it would not have been feasible to assess the economic impact of every possible combination of links.

Instead, separate scenarios were explored. Under Scenario 1, it is assumed that full length of the Cook Inlet to Bristol Bay roadway is implemented, together with navigation and harbor improvements. Under Scenario 2, it is assumed that only select improvements in the Cook Inlet to Bristol Bay Corridor, including a connection to Dillingham, are implemented: namely, the navigational improvements at Williamsport and rehabilitation and widening of the existing road and bridges between Williamsport and Pile Bay. This scenario provides benefits only to communities on Iliamna Lake. In addition a third scenario is examined, specific to the Iliamna–Nondalton and Dillingham–Aleknagik projects. This scenario examines only the effects of these two projects, in the absence of any other assumed improvements.

Results for Scenario 1, Scenario 2, and Scenario 3 are provided separately. The results for Scenario 1, including Tables 5, 6 and 7, are presented first, in the section entitled Scenario 1: Implement Entire Roadway System. Then the results for Scenario 2, including Tables 8 and 9, are presented in the section entitled Scenario 2: Implement Williamsport to Pile Bay Improvements. Finally the results for Scenario 3, including Table 10, are presented in the section entitled Scenario 3: Implement Iliamna–Nondalton and Dillingham–Aleknagik Projects.

Scenario 1: Implement the Cook Inlet to Bristol Bay Roadway System

Petroleum Movement Cost Savings Summary

Building the Cook Inlet to Bristol Bay Roadway System, including a connection to Dillingham, would result in petroleum freight movement cost savings to most communities. Currently most petroleum is delivered by barge via Bristol Bay. The communities on Bristol Bay receive their shipments directly, while the communities on Iliamna Lake require that petroleum be transferred to smaller barges that navigate the Kvichak River during its brief season of navigability. This season, during which the river is both ice-free

and high enough to support even shallow-draft vessels, generally runs from August to November. As shown in Table 5, the current rate for delivery of petroleum, in dollars per gallon, is nearly three times as much for the Iliamna Lake communities as for the communities on Bristol Bay, 80¢ vs. 30¢.

With Scenario 1, the estimated lowest cost route for petroleum would be via barge to Williamsport then via tanker truck over the Cook Inlet to Bristol Bay Road, even though this requires transferring the petroleum from barge to truck at Williamsport. The estimated barging cost to Williamsport would be 10¢ per gallon, compared to 30¢ for a barge trip around the Alaska Peninsula and into Bristol Bay. Added to this would be a trucking cost of 0.09¢ per gallon per mile. Total costs would range from about 12¢ per gallon to Pedro Bay to about 30¢ per gallon to Dillingham. The largest savings would be for the Iliamna Lake communities that currently require shipping via the Kvichak River.

Modest savings, in contrast, are anticipated for the Bristol Bay communities that are served directly by relatively frequent barge service, as part of the larger Bristol Bay market. According to this analysis, the cost of petroleum movement to Naknek is projected to fall only a few cents – from 30¢ to 27¢ per gallon. Dillingham and Aleknagik would have no net savings, as the price via Williamsport would be the same as the current price, 30¢. The Bristol Bay communities, however, would benefit from the barge and road route via Williamsport in that it would be open during winter months when barge shipments to Bristol Bay cannot be made.

Total petroleum freight movement cost savings from building the Cook Inlet to Bristol Bay Roadway System, including a connection to Dillingham, are estimated at $565,700 annually (Table 5).

Table 5
Estimated Petroleum Movement Cost Savings
Scenario 1

	2020 Forecast Consumption (gal)	Current Rate ($/gal)	Estimated Rate with Road[1] ($/gal)	2020 Cost Estimate Using Existing Rates ($ paid)	2020 Cost Estimate Assuming Scenario 1 is Implemented ($ paid)	2020 Savings Achievable ($ saved)
Pedro Bay	49,180	$0.800	$0.120	$39,300	$5,900	$33,400
Iliamna / Newhalen	303,280	$0.800	$0.150	$242,600	$45,500	$197,100
Nondalton	270,490	$0.800	$0.160	$216,400	$43,300	$173,100
Igiugig	73,770	$0.800	$0.200	$59,000	$14,800	$44,200
King Salmon / Naknek	1,139,340	$0.300	$0.270	$341,800	$307,600	$34,200
South Naknek	139,340	$0.300	$0.270	$41,800	$37,600	$4,200
Levelock	139,340	$0.800	$0.230	$111,500	$32,000	$79,500
Aleknagik	229,510	$0.300	$0.300	$68,900	$68,900	$0
Dillingham	2,795,080	$0.300	$0.300	$838,500	$838,500	$0
			TOTALS	**$1,959,800**	**$1,394,100**	**$565,700**

[1] This cost estimate assumes that a tanker truck with a 7,500-gallon capacity is used.

"Other" Cargo Movement Cost Savings Summary

Cargo movement savings achievable by implementing Scenario 1 are anticipated in two major areas. The first, and the primary focus of this assessment, is the savings that can be achieved in moving goods and commodities to communities in Southwest Alaska. The second has to do with savings achieved by providing the region's gillnet fishers a more viable route between their fishing grounds in Bristol Bay, and Cook Inlet, where many store their vessels during the off-season, and where many have repair and maintenance done. These impacts are explored separately.

Commodities Movement Impacts

Listed in Table 6 is a summary of estimated cost savings in commodities movements based on the rate calculations, and port call assumptions earlier discussed. This analysis suggests that about $10.2 million per year could be saved in freight costs in terms of moving "Other" cargo alone, if Scenario 1 is implemented. Note that cargo shipment mode shift under the proposed infrastructure improvements had to be taken into account in this analysis. These mode shift assumptions are documented in Table 6. These mode shift assumptions, under both existing conditions and under the assumption that Scenario 1 is built, are based on primary source data and area shippers' input. Table 6 also reflects several changes in air freight rates resulting from the implementation of new roadway connections, specifically, roadway connections linking Nondalton to Iliamna Airport, South Naknek to King Salmon Airport, and Aleknagik to Dillingham Airport. At present air cargo to the these three smaller communities is transferred from a larger plane to a smaller plane at the hub airport, flown to the community airport, then delivered to its final destination. With the new roadway connections, air freight can be delivered to these three smaller communities directly from the hub airport, eliminating the need for an additional flight.

A few explanations regarding the Iliamna Lake communities are needed to interpret Table 6. First, a weighted average was used in calculating the marine shipment rate under existing conditions for Iliamna Lake communities. This weighted average takes into account the percentage shipped, and rates paid, for marine freight via Naknek and Williamsport, respectively. In terms of projected rates, this analysis

assumes that if the Cook Inlet to Bristol Bay Roadway System is built then most waterborne cargo will be shipped to Iliamna Lake communities via Williamsport.

Gillnet Fleet Transport Impacts

In its 1995 economic assessment, the US Army Corps of Engineers (USCOE) pointed out another area of savings that could be realized if these improvements were made. They point to the many gillnet vessels that each year make the trip from Cook Inlet to the fisheries in Bristol Bay and back. Some vessels are transported because they spend the off-season in Cook Inlet; others make the trip periodically for repairs and maintenance purposes. In all, about 825 gillnet boats are estimated to make the round trip each year.

Of these, the vast majority (about 785) sail around the Alaska Peninsula, a 1,100-mile trip that takes three days, and is estimated to cost $1,800. A small contingent (about 40), however, makes the trip via Williamsport, which is almost a thousand miles shorter and is estimated to cost about $1,233 per vessel. Although this trip is less costly in terms of both time and dollars, it is arduous, risky, and can only be undertaken during narrow time windows. Moreover, many gillnet vessels cannot be transported via this route because they are too wide to pass through existing bridges.

According to the US Army Corps of Engineers' detailed analysis, savings in the neighborhood of $1,082,500 could be achieved on the part of gillnet vessel movement alone if the Williamsport Channel were dredged, and if the existing Williamsport to Pile Bay Road and its bridges were rehabilitated.[6] Accordingly, these estimated savings are added to the freight movement savings estimated earlier.

[6] According to the USCOE, the number of gillnet vessels taking the Williamsport route would increase from 40 to 747 round trips per year (*Navigation Channel Feasibility Report and Environmental Assessment, Williamsport*, US Army Corps of Engineers, Alaska District, December 1995).

Table 6
Estimated "Other" Cargo Cost Savings
Scenario 1

	Mode Split and Rates Under Existing Conditions					Mode Split and Rates Assuming Scenario 1 is Implemented				Results		
	Marine %	Air %	Marine ($/lb.)	Air ($/lb.)	2020 Freight Volume Estimate (lbs.)	Barge/ Road %	Air %	Barge/ Road[1] ($/lb.)	Air ($/lb.)	Freight Costs Paid in 2020 Assuming No Change ($)	Freight Costs Paid in 2020 Assuming Scenario 1 is Implemented ($)	Savings Possible due to Scenario 1 ($)
Pedro Bay	60%	40%	0.686	0.640	486,000	85%	15%	0.276	0.640	$324,500	$160,700	$163,800
Iliamna/Newhalen	65%	35%	0.686	0.390	2,997,000	85%	15%	0.283	0.390	$1,745,500	$896,300	$849,200
Nondalton	65%	35%	0.802	0.640	2,673,000	85%	15%	0.283	0.390	$1,992,200	$799,400	$1,192,800
Igiugig	70%	30%	0.686	0.640	729,000	85%	15%	0.297	0.640	$490,000	$254,000	$236,000
King Salmon/ Naknek	75%	25%	0.510	0.420	11,259,000	85%	15%	0.286	0.420	$5,488,800	$3,446,400	$2,042,400
South Naknek	75%	25%	0.510	0.670	1,377,000	85%	15%	0.286	0.420	$757,400	$421,500	$335,900
Levelock	75%	25%	0.765	0.640	1,377,000	85%	15%	0.298	0.640	$1,010,400	$481,000	$529,400
Aleknagik	75%	25%	0.655	0.670	2,268,000	85%	15%	0.325	0.420	$1,494,000	$769,400	$724,600
Dillingham	75%	25%	0.510	0.420	27,621,000	85%	15%	0.325	0.420	$13,465,200	$9,370,400	$4,094,800
TOTALS					**50,787,000**					**$26,768,000**	**$16,599,100**	**$10,168,900**

[1] Barge cost to Williamsport plus trucking cost at 0.03¢ per pound per mile.

"Other" Cargo Movement Cost Savings Summary

Total freight movement cost savings under Scenario 1 is estimated at $11,817,100. Of this total, $1,082,500 is attributable to gillnet vessel transport savings. To these savings can be added $565,700 in petroleum movement savings, along with $10,168,900 in "Other" commodity movement savings (Table 7).

Table 7
Scenario 1
Freight Movement Cost Savings Summary

Petroleum	**$565,700**
Gillnet Fleet	**$1,082,500**
Other Cargo	**$10,168,900**
TOTAL	**$11,817,100**

Scenario 2: Implement Williamsport to Pile Bay Improvements

If the Williamsport to Pile Bay Road were rehabilitated, in tandem with navigational improvements at Williamsport, it is estimated that most of the Iliamna Lake-bound cargo now barged up the Kvichak River from Naknek would shift to the Williamsport route. In addition, since marine transport under this scenario would be viable during the ice free season on Iliamna Lake (generally from May to November), rather than only during the season when the Kvichak River is both ice-free and high enough to support shallow draft vessels (generally August to November) it is also assumed that a portion of the cargo now flown into Iliamna Lake communities would be barged, trucked, and then shipped again via Williamsport. Whereas the mode split for Iliamna Lake communities is currently estimated to be from 48% to 52% marine via Naknek, from 12% to 13% marine via Williamsport, and from 35% to 40% by air; with the proposed improvements, cargo volumes are assumed to shift to 10% marine via Naknek; 65% marine via Williamsport; and 25% by air.

It is estimated that these improvements would lower the cost of moving cargo to Iliamna Lake communities (via a surface route) from 37 to 24 cents per pound. When the assumed mode shift and rate values are applied to the cargo forecast volumes for the 2020 design year, savings attributable to the project can be calculated, as shown in Table 8.

While the rehabilitation of the Williamsport to Pile Bay Road, in tandem with navigational improvements at Williamsport, is estimated to result in changes in the pattern of delivery of "Other" cargo to Iliamna Lake communities, it is not expected that changes in the movement of petroleum would occur. Under this scenario, petroleum would have to be pumped from a barge to a truck at Williamsport, from a truck to a barge at Pile Bay, then again from a barge to a truck for delivery to its final destination, in contrast to Scenario 1 where the tanker truck that receives the petroleum in Williamsport can deliver it directly to its final destination.

Table 8
Estimated "Other" Cargo Cost Savings
Scenario 2

	2020 Forecast "Other" Cargo (lbs.)	Mode Split, Rates and Costs Under Existing Conditions				Mode Split, Rates and Costs Under Scenario 2				
		Marine via Naknek	Marine via Wmsport	Air	TOTAL Freight Costs Paid	Marine / Road via Naknek	Marine / Road via Wmsport	Air	TOTAL Freight Costs Paid	Savings Due to Scenario 2
Pedro Bay										
Mode Split	486,000	48%	12%	40%	$324,500	10%	65%	25%	$190,800	**$133,700**
Rate		$0.765	$0.370	$0.640		$0.765	$0.240	$0.640		
Iliamna / Newhalen										
Mode Split	2,997,000	52%	13%	35%	$1,745,500	10%	65%	25%	$989,000	**$756,500**
Rate		$0.765	$0.370	$0.390		$0.765	$0.240	$0.390		
Nondalton										
Mode Split	2,673,000	52%	13%	35%	$1,992,200	10%	65%	25%	$882,100	**$1,110,100**
Rate		$0.910	$0.370	$0.640		$0.765	$0.240	$0.390		
Kokhanok										
Mode Split	2,025,000	52%	13%	35%	$1,356,500	10%	65%	25%	$794,800	**$561,700**
Rate		$0.765	$0.370	$0.640		$0.765	$0.240	$0.640		
Igiugig										
Mode Split	729,000	48%	12%	40%	$490,000	10%	65%	25%	$286,100	**$203,900**
Rate		$0.765	$0.370	$0.640		$0.765	$0.240	$0.640		
TOTALS					**$5,908,700**				**$3,142,800**	**$2,765,900**

Scenario 2 also achieves gillnet fleet transport savings described for Scenario 1. Accordingly, $1,082,500 in gillnet fleet savings can be added to the $2,765,900 figure for "Other" cargo, for total freight movement savings achievable under this scenario estimated at $3,848,400 per year (Table 9).

Table 9
Scenario 2
Freight Movement Cost Savings Summary

"Other" Cargo	**$2,765,900**
Gillnet Fleet	**$1,082,500**
TOTAL	**$3,848,400**

Scenario 3: Implement Iliamna–Nondalton and Dillingham–Aleknagik Projects

This scenario examines the freight cost savings achievable with the implementation of the Iliamna–Nondalton and Dillingham–Aleknagik projects by themselves, without other parts of the Cook Inlet to Bristol Bay Roadway System. In the case of the Iliamna–Nondalton project, the savings are due to connecting Nondalton by road to the Iliamna Airport and to barge traffic on Iliamna Lake. In the case of the Dillingham–Aleknagik project, the savings are due to connecting Aleknagik by road to the Dillingham Airport and by accessing more frequent barge service at Dillingham.

All savings that would be realized by implementation of these projects would be in the "Other" cargo category. No petroleum cost savings are assumed. As shown on Table 10, annual freight savings from the Iliamna–Nondalton project would be $435,400; from the Dillingham–Aleknagik project $388,300.

Table 10
Estimated "Other" Cargo Cost Savings
Scenario 3

	Mode Split and Rates Under Existing Conditions					Mode Split and Rates Assuming Scenario 3 is Implemented				Results		
	Marine %	Air %	Marine ($/lb.)	Air ($/lb.)	2020 Freight Volume Estimate (lbs.)	Marine %	Air %	Marine ($/lb.)	Air ($/lb.)	Freight Costs Paid in 2020 Assuming No Change ($)	Freight Costs Paid in 2020 Assuming Scenario 3 is Implemented ($)	Savings Possible due to Scenario 3 ($)
Nondalton	65%	35%	0.802[1]	0.640	2,673,000	65%	35%	0.686[2]	0.390[2]	$1,992,200	$1,556,800	$435,400
Aleknagik	75%	25%	0.655[3]	0.670	2,268,000	75%	25%	0.510[4]	0.420[4]	$1,494,000	$1,105,700	$388,300

[1] Includes cost of offloading from a Lake Iliamna barge and then transporting to Nondalton by smaller vessel.
[2] Includes cost of trucking from Iliamna or Newhalen
[3] Includes cost of offloading from a Bristol Bay barge and then transporting to Aleknagik by smaller vessel.
[4] Includes cost of trucking from Dillingham

Allocation of Freight Savings to Roadway Segments

Scenario 1 describes the freight savings that would accrue to various communities with implementation of the Cook Inlet to Bristol Bay Roadway System, coupled with navigation improvements at Williamsport, while scenario 2 describes the freight savings that would accrue just with the navigational improvements at Williamsport and rehabilitation and widening of the existing road and bridges between Williamsport and Pile Bay. The Scenario 2 examination shows that the Williamsport–Pile Bay improvements by themselves would yield considerable benefits in terms of freight cost savings, on the order of $3,554,600. As described in the Southwest Alaska Transportation Plan, November 2002, and reiterated in the Findings section of this technical memorandum, these benefits exceed the annualized capital cost plus O&M cost of the project. Therefore it is reasonable to assume that the Williamsport–Pile Bay improvements might be implemented even in the absence of extension of the roadway system further west. Thus it is appropriate when comparing the freight savings benefits due to the extension of the roadway to Bristol Bay to use only the incremental savings due to the road system, i.e. the Scenario 1 savings less the Scenario 2 savings. These incremental savings are shown in Table 11.

Further, freight savings benefits accrue to a particular community only if that community is connected by road all the way to Williamsport. For example, savings for Naknek from shipping freight via road from Williamsport are only realized if all the segments of road between Naknek and Williamsport are in place. Thus the freight savings from implementation of the entire roadway system need to be allocated to individual roadway segments in proportion to the savings accrued to all communities down road, not just the savings that would occur in the next community. The allocation of the freight savings to roadway segments in shown in Table 12.

Table 11
Incremental Freight Cost Savings

	"Other" Cargo			Petroleum	
	Savings Attributable to Scenario 1	Savings Attributable to Scenario 2	Net Savings	Savings Attributable to Scenario 1	Total Incremental Savings
Pedro Bay	$163,800	$133,700	$30,100	$33,400	$63,500
Iliamna/Newhalen	$849,200	$756,500	$92,700	$197,100	$289,800
Nondalton	$1,192,800	$1,110,100	$82,700	$173,100	$255,800
Igiugig	$236,000	$203,900	$32,100	$44,200	$76,300
King Salmon/ Naknek	$2,042,400	$0	$2,042,400	$34,200	$2,076,600
South Naknek	$335,900	$0	$335,900	$4,200	$340,100
Levelock	$529,400	$0	$529,400	$79,500	$608,900
Aleknagik	$724,600	$0	$724,600	$0	$724,600
Dillingham	$4,094,800	$0	$4,094,800	$0	$4,094,800
TOTALS	**$10,168,900**	**$2,204,200**	**$7,964,700**	**$565,700**	**$8,530,400**

Table 12
Allocation of Incremental Freight Savings to Roadway Segments

Segment	Estimated Annual Freight Cost Savings
Pile Bay to Pedro Bay to Iliamna	$2,247,800
Iliamna to Nondalton	$115,800
Iliamna to Igiugig	$1,974,700
Igiugig to Naknek	$599,100
Naknek to South Naknek	$83,900
Jct. w/ Igiugig Road to Levelock	$1,343,400
Levelock to Aleknagik	$1,170,900
Aleknagik to Dillingham	$994,800
	$8,530,400